

What is claimed is:

5
507
a1

1. A package for optical micro-mechanical devices, comprising:
a die comprising one or more optical micro-mechanical devices on a first
surface of a substrate, the first surface including a die reference surface;
a tooling fixture attached to a second surface of the die;
a package frame comprising an aperture and a package frame reference
surface proximate the aperture adapted to receive the die reference surface such that the
optical micro-mechanical devices are located in the aperture;
one or more optical interconnect alignment mechanisms terminating
adjacent to the aperture; and
distal ends of one or more optical interconnects located in the optical
interconnect alignment mechanisms and optically coupled with one or more of the optical
micro-mechanical devices.
2. The apparatus of claim 1 wherein the tooling fixture comprises a
heat sink.
3. The apparatus of claim 1 wherein the tooling fixture comprises a
compliant thermally conductive material.
4. The apparatus of claim 1 wherein the tooling fixture comprises a
tooling post.
5. The apparatus of claim 1 comprising a cover sealing the die and the
tooling fixture to the package frame.
6. The apparatus of claim 5 wherein the tooling fixture engages with
the cover.

7. The apparatus of claim 1 comprising an encapsulating material sealing the die and the tooling fixture to the package frame.

8. The apparatus of claim 1 comprising one or more contact pads interposed between the die reference surface and the package frame reference surface.

9. The apparatus of claim 8 wherein the contact pads electrically couple one or more optical micro-mechanical devices with external electrical contacts.

10. The apparatus of claim 8 wherein the contact pads electrically couple one or more optical micro-mechanical devices with a flexible circuit member.

11. The apparatus of claim 8 wherein the contact pads electrically couple one or more optical micro-mechanical devices with contact pads located on the package frame reference surface.

Sub 27
12. A method of packaging optical micro-mechanical devices, comprising:
preparing a die comprising one or more optical micro-mechanical devices on a first surface of a substrate, the first surface including a die reference surface;
attaching a tooling fixture to a second surface of the substrate;
preparing a package frame including an aperture and a package frame reference surface proximate the aperture adapted to receive the die reference surface such that the optical micro-mechanical devices are located in the aperture; and
preparing one or more optical interconnect alignment mechanisms on the package frame, the optical interconnect alignment mechanisms on the package frame being positioned to align with corresponding optical micro-mechanical devices on the die when the die reference surface is engaged with the package frame reference surface.

13. The method of claim 12 comprising the steps of:

positioning one or more optical interconnects in the optical interconnect alignment mechanisms on the package frame; and

engaging the die reference surface with the package frame reference surface to capture the optical interconnects.

5

14. The method of claim 12 comprising the step of capturing one or more optical interconnects between in the optical interconnect alignment mechanisms on the package frame and the corresponding optical interconnect alignment mechanisms on the die.

10

15. The method of claim 12 wherein the step of attaching the tooling fixture occurs before the optical micro-mechanical devices are released from the substrate.

16. The method of claim 12 wherein the step of attaching the tooling fixture occurs before the step of preparing a die including one or more optical micro-mechanical devices.

17. The method of claim 12 wherein the tooling fixture comprises a heat sink.

18. The method of claim 12 wherein the tooling fixture comprises a tooling post.

19. The method of claim 12 wherein the tooling fixture comprises a compliant thermally conductive material.

20. The method of claim 12 comprising sealing the die and the tooling fixture to the package frame using an encapsulating material.

21. The method of claim 12 comprising sealing the die and the tooling fixture to the package frame using a cover.

22. The method of claim 21 comprising the step of engaging the tooling fixture with the cover.